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Information and Communication Technologies, Poverty and Development

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Information and Communication Technologies, Poverty and Development

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Abstract

Can information and communication technologies (ICTs) help to alleviate poverty in low-income countries? The paper investigates this question, focusing particularly on the role of ICTs in assisting the development of small and micro-enterprises. The investigation is based on a systemic understanding of both technology and enterprise. This suggests that ICTs will play a role mainly as a communication technology rather than as an information processing or production technology. Serious inequalities exist that constrain the use of ICT-based information by poor entrepreneurs. Information and communication technologies may therefore have a greater role to play in giving 'voice' to the poor; that is, in making the poor information providers more than information recipients. However, effective application must first overcome the 'ICT fetish' that dominates much development thinking at present, and which creates a series of identified opportunity costs. The paper concludes with a set of development priorities for information and for ICT use in poverty alleviation.

[1] An amended version of this paper will appear in the chapter on 'Technology and Development' in *Poverty and Development in the 2000s*, T. Allen & A. Thomas (eds), Oxford University Press: http://www.oup.co.uk/

Introduction

Hundreds of billions of dollars per year are spent on information and communication technologies (ICTs), reflecting a powerful global belief in the transformatory potential of these new technologies. For multinational corporations, certainly, ICTs have become essential. Globalisation demands such great flows of information and processing of information that it simply could not take place without ICTs.

But what about a more direct relationship between ICTs and development. What, for example, do ICTs have to offer the poor? Some clearly believe the technology has a lot to offer:

> "This new technology greatly facilitates the acquisition and absorption of knowledge, offering developing countries unprecedented opportunities to enhance educational systems, improve policy formation and execution, and widen the range of opportunities for business and the poor." (World Bank 1998:9)

> "Governments, donors and development organisations are rushing to realise the benefits that Internet access promises in the fight against poverty." (Panos 1998a:1)

There are opportunities for applying the new technology in supplying health, educational and agricultural information. In this paper, though, the particular focus will be the scope for ICTs in small and micro-enterprises. Why? Because these enterprises have such a direct and growing relationship to poverty alleviation.

A. Understanding ICTs and Enterprise Through Systemic Models

We need to take a systemic, contextual view of technology in order to understand it (Heeks 1998). The same is also true of enterprise, and so systemic models of each will now be presented.

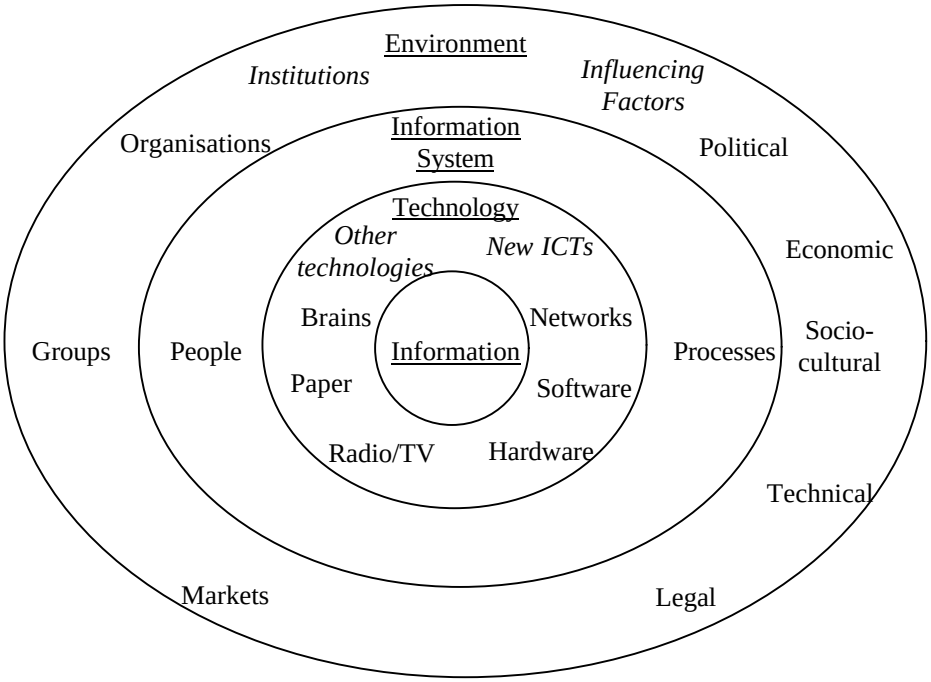
Information and Communication Technologies

Information and communication technologies can be defined as 'electronic means of capturing, processing, storing, and communicating information'. ICTs are based on digital information held as 1s and 0s, and comprise computer hardware, software and networks. These will be the main focus of the paper, but they are not the only technology that deals with information. Others include:

- 'Intermediate' technology, still based largely on analogue information held as electro-magnetic waves such as radio, television and telephone.
- 'Literate' technology, based on information held as the written word such as books and newspapers.
- 'Organic' technology, based solely on the human body such as the brain and sound waves.

In building up a model of ICTs, two separate elements have already been identified: the technology itself and the information on which it operates. In order to make this useful, we add in two further components: processes of purposeful activity and people to undertake those processes. All of these together now make up an 'information system', such as a support system that helps members of an NGO team share information using electronic mail. But this information system cannot sit in a vacuum. It exists within an environment of institutions (organisations, groups, markets) and of influencing factors (political, economic, socio-cultural, technical and legal). Putting all this together, we arrive at the model shown in Figure 1.

Figure 1: A Systemic View of Information and Communication Technologies

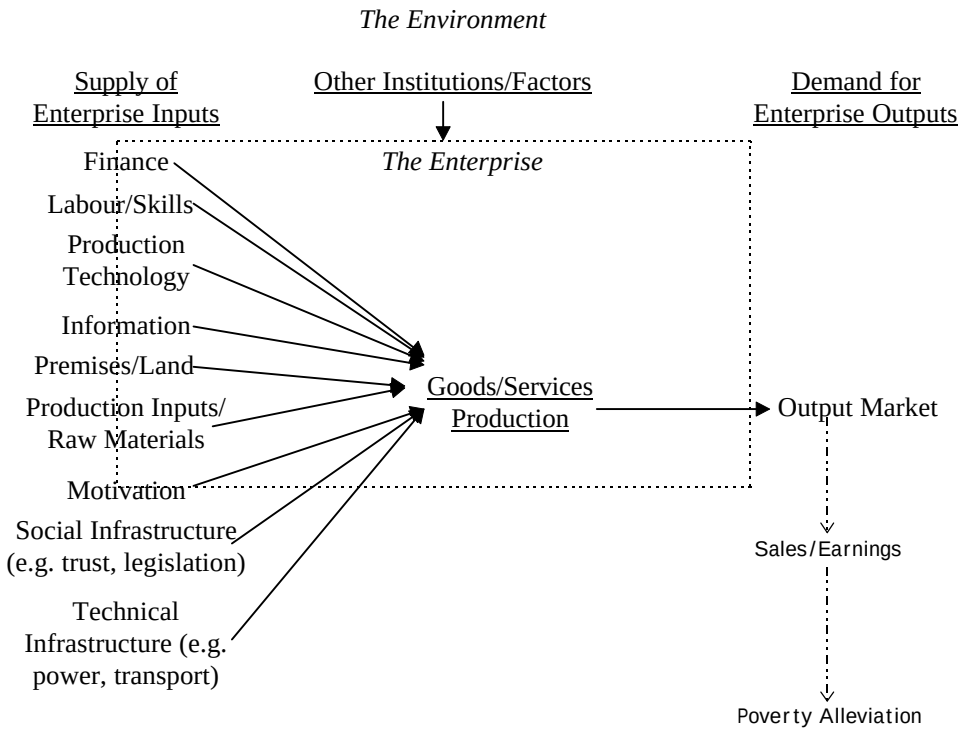


Both description and diagram are a reminder that information and communication technologies cannot be understood unless one also understands: a) information and its role, and b) the institutional and factoral environment.

Small/Micro-Enterprise

A similar systemic model can be built for the operation of an enterprise, as shown in Figure 2.

Figure 2: A Systemic View of Small/Micro-Enterprise



From this diagram and the earlier definition, four main potential roles for ICTs can be identified:

- *As an output* and *As a production technology*. Some enterprises produce either tangible (computers, networks, components) or intangible (software, Web pages) ICTs as an output. Other enterprises, such as designers and publishers, produce heavily information-based outputs. Both use ICTs as a production technology, and both form part of a nation's 'information economy'. Such enterprises are becoming increasingly vital to low-income countries, and represent a beneficial application of ICTs in terms of income, skill and export generation. However, thanks to scale economies and input barriers, these areas have traditionally been the preserve of

large and/or highly-skilled, capital-intensive firms. Barriers are coming down but these enterprises still remain at one step removed from 'mainstream' poverty alleviation, and will not be the focus here.

- *As an information processing technology*. All enterprises need to process the information that arises from both inside and outside the enterprise. However, the requirement of most small/micro-enterprises for processing formal information is relatively limited, and it can frequently be met by paper-based methods. Also, given relatively high ICT costs and relatively low labour costs in low-income countries, ICTs can easily raise rather than lower processing costs. Again, this will therefore not be the focus here.

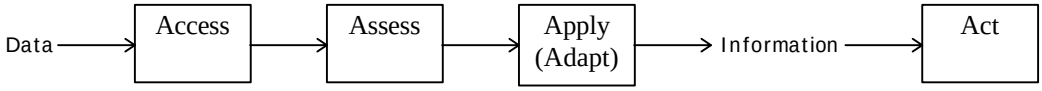
- *As an information communication technology*. Small/micro-enterprises do have a significant need for both receipt and provision of information. Add in the fact that ICTs normally lower communication costs substantially, and this can be seen as the main potential area for ICT application by low-income country small/micro-enterprises. The paper will now look at ICTs' role in relation to both receipt and transmission of information.

B. The Poor as Information Recipients

As noted, ICTs cannot be understood without understanding information, and developing an enterprise requires information about several different things. It needs information relating to *supply*, such as the availability and sources of finance, labour, technology, raw materials, and other enterprise inputs. It needs information about *demand*, including market opportunities and characteristics of this market demand like location, price, size, and quality. It also needs information about *other environmental factors*, like competitors, laws, etc.

Turning raw data into this kind of usable information is a staged process (the 'information chain'), illustrated by the '4 As' model in Figure 3.

Figure 3: The Information Chain



In order for the information chain to function, environmental components must be present that will now be investigated. These include *overt resources* (money, skills, technical infrastructure), *embedded/social resources* (trust, motivation, knowledge, power) and *relevant raw data*.

Overt Resource Inequalities Affecting Access

> "New communications technologies are revolutionising access to information - but the revolution is likely to reach everyone but the poor." (Panos 1998b)

Accessing ICT-carried information requires a lot of overt resources including a telecommunications infrastructure to provide network access, an electrical infrastructure to make the ICTs work, a skills infrastructure to keep all the technology working, money to buy or access the ICTs, usage skills to use the ICTs, and literacy skills to read the content.

The poor simply do not have these resources. In a world where 80% of the world's population has no access to reliable telecommunications, and one third has no access to electricity (Panos 1998a), it is hardly surprising that the Internet reaches few poor people: there are more account holders in London than in the whole of Africa and many of the latter are affluent, white, urban South Africans[2]. Likewise, more than half

[2] Such figures must be treated with care. Western models of one email account serving one individual do not hold in low-income countries. Instead, several individuals are likely to make use of one

of the low-income countries' population is illiterate, with a far greater proportion unable to read English, the language that dominates digitised information (UNDP 1998a).

Governments and donor agencies are working to provide the overt resources, but realistically the poor will not own the ICTs, and the poor will be very unlikely to control the ICTs or to use the technology hands-on in any significant numbers for the foreseeable future. The main strategy has therefore been to provide ICTs to intermediary institutions such as government agencies, NGOs and community-based organisations.

The most popular model is the community 'telecentre' with an Internet-linked computer providing a multi-function resource (Talero & Gaudette 1995). Only a few exist so far in low-income countries. Bringing them to all poor communities would be a massive operation requiring huge diversion of investments and taking at least a generation. Most would also require large ongoing subsidies to sustain them in the midst of poverty.

But even this would not be enough.

Social Resource Inequalities Affecting Assessment and Application

Poor entrepreneurs need more than money, skills and infrastructure in order to make use of the data delivered by ICTs. They need other resources to interact with sources outside their own community, including (World Bank 1998, Panos 1998b):

- *'Source proximity'*. Data is created within a particular context and retains embedded characteristics of that context: it contains what its creators do know and do feel is important and misses out what they do not know or do not feel is important; it reflects their political and economic beliefs; it reflects their culture.

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account through family, friends, acquaintances or organisations. Formal statistics therefore seriously underestimate the extent of coverage, perhaps by a factor of five or more.

Unless poor entrepreneurs come from the same context as the sources creating information, problems of miscommunication and misunderstanding can arise.

- *Trust*. Before they will accept data, recipients must trust both its source and its communication channel. For most entrepreneurs, sufficient trust to justify business decisions will mainly be created through personal contact, through interaction and, ideally, through shared context/proximity.
- *Knowledge*. Information creates knowledge, but knowledge is also needed to create information. It is knowledge that helps us to access information, by knowing where to find and how to use information sources. It is knowledge that helps us to assess information, by assessing whether it is truth or lies, of value or not. It is knowledge that helps us to apply information, by adapting it to our particular needs and circumstance. For the poor, such knowledge is frequently limited to their local context.
- *Confidence and security*. In order to use new communication channels, recipients must have confidence and feel motivated to take a certain amount of risk. In general, because of their social circumstance and experience, the poor lack confidence and are risk averse.

None of these represent insuperable barriers and they should not be seen as excuses for inaction. However, they do all add to the problems of using ICTs particularly because the poor lack the power to access or demand further social and overt resources.

Resource Inequalities Affecting Action

Information supplied via ICTs (or via any other means) has no value unless it informs decision making and action. Yet action implies resource endowments that have nothing to do with ICTs. Information received about a new supplier is of no value if the entrepreneur does not trust the supplier. Information about a new market is of no value if the entrepreneur cannot increase production to supply that market, through lack of capacity or aversion to risk. Information about new government tax rules is of no value if the entrepreneur cannot afford to pay tax. Inequality in endowment of both overt and social resources for action therefore keeps poor entrepreneurs poor regardless of whether information is supplied to them via ICTs.

We can therefore see – as Figure 2 has already pointed out – that information (and, hence, information and communication technologies) is only one resource amongst many overt and social resources that are required for successful development of a small/micro-enterprise. Put another way, information is a necessary resource for poverty alleviation but it is by no means a sufficient one. Equally – indeed more – important are factors such as financial credit, skills, production technology, demand for outputs, plus other social resources. All of these have to be borne in mind when assessing the relative priority to give to ICTs in the development process.

Lack of Relevant Data

As has been argued above, poor entrepreneurs get their most valuable information via informal information systems from those around them and like them. Unfortunately, the information from such systems can be inaccurate and is certainly incomplete. Formal information sources, however, can be just as bad in meeting needs as they are increasingly dominated by commercially-inspired data or trivia. The Web, for instance, mainly provides the information-thirsty poor with a flood of 'noise': digitised, Westernised irrelevance.

Markets therefore fail poor entrepreneurs not just in terms of information chain processes but also in terms of input: they do not provide enough relevant raw data for the poor (especially not in digitised form) about everything from materials suppliers to market prices to government regulations. In part, this is due to the inability of the poor to voice their demand for information and their inability to pay for supply of that information.

Where markets fail, national and global institutions may – and do – step in. UN bodies provide data about technology suppliers; governments provide data about market prices and regulations. Yet there are many problems here, in part because such interventions tend to be rather haphazard and frequently unsustainable. There can also be data problems. The data provided is rarely in digitised form, making it suitable only

for non-ICT-based media, and it is often driven by the objectives of the source rather than the needs of the recipient (see Box 1). Lastly, unless the provider is a community-based institution, there remains a lack of proximity between such sources and poor entrepreneurs as recipients.

Box 1: ICT Failure and Success in South Africa

Adapted from Benjamin 1999

In 1995, a project was begun by the Office of the Premier in North-West Province to provide information to six rural communities through touch-screen computer kiosks. The kiosks provided general demographic and economic information about the province, details of main government programmes, and speeches by the Premier and by Nelson Mandela. This did not meet community needs and it became apparent that this had been more a public relations exercise than a development initiative. The project was scrapped in 1997.

In 1995, a project was begun by the local government in Alexandra township (near Johannesburg) to create a database of local resources. All township organisations were asked to provide details, a process often organised by school children as homework. The database was made accessible over the Internet. Not only did it provide information about local capabilities to community members, it also enabled community enterprises to win contracts from larger firms in Johannesburg.

C. The Poor as Information Sources

There is a general assumption within much writing about ICTs that the poor are merely recipients: of technology, of information, of knowledge. Of course, this is not correct. Poor countries now all produce at least some information and communication technologies, in the form of customised software systems. Poor communities all produce their own information and knowledge. ICTs can play a positive role, as in

Alexandra (see Box 1), by allowing that information and knowledge to be more widely disseminated.

ICTs could be used to transmit information from poor entrepreneurs to donor and government agencies. The main reported ICT use, though, has been to transmit marketing information about small/micro-enterprise products and services to potential customers; typically via the Web to Western export markets (World Bank 1998, Hegener 1998). However, there are far more one-line, rose-tinted vignettes of claimed success with ICTs than there are long-term analytical studies by independent researchers.

We can see, once again, that ICTs are neither a universally necessary nor a sufficient condition for giving voice to poor entrepreneurs. In the first case, there are many other – potentially more appropriate – mechanisms to assist the poor, from face-to-face meetings to telephone conversations to newsletters and even radio/TV programmes. On the second point, technology only affects part of a much broader social process. Poor entrepreneurs must also have the capacity to generate relevant information about themselves, and to access and use the ICTs. Frequently they do not have this capacity, and they will again have to rely on intermediaries. At the other end of the transmission chain, someone must also be listening and able to act on what they hear. Panos (1998a), for example, describes the termination of a Web service selling low-income country products to Western consumers due to lack of use.

D. Examining the Contemporary ICT Fetish

So far, this paper has analysed the opportunities, challenges and problems for poor people that are posed by ICTs in relation to small/micro-enterprise. However, such analysis is rare, for, like any new generic technology, ICTs lend themselves to sweeping statements about what they can do for development. If the poor are considered overtly at all, the feeling is that they *must* gain eventually from adopting the technology because the technology *is* development. This dominant 'technology-as-

solution' view has its challengers, of course, and one can place different views into perspective through use of a viewpoints framework.

Such a framework about ICTs can be constructed from two continua (see Figure 4). First, a continuum of *technology impacts*, from optimism to pessimism. Some people – optimists – associate ICTs with largely positive impacts like wealth creation and improvements in service quality. Others – pessimists – associate ICTs with largely negative impacts like unemployment and alienation.

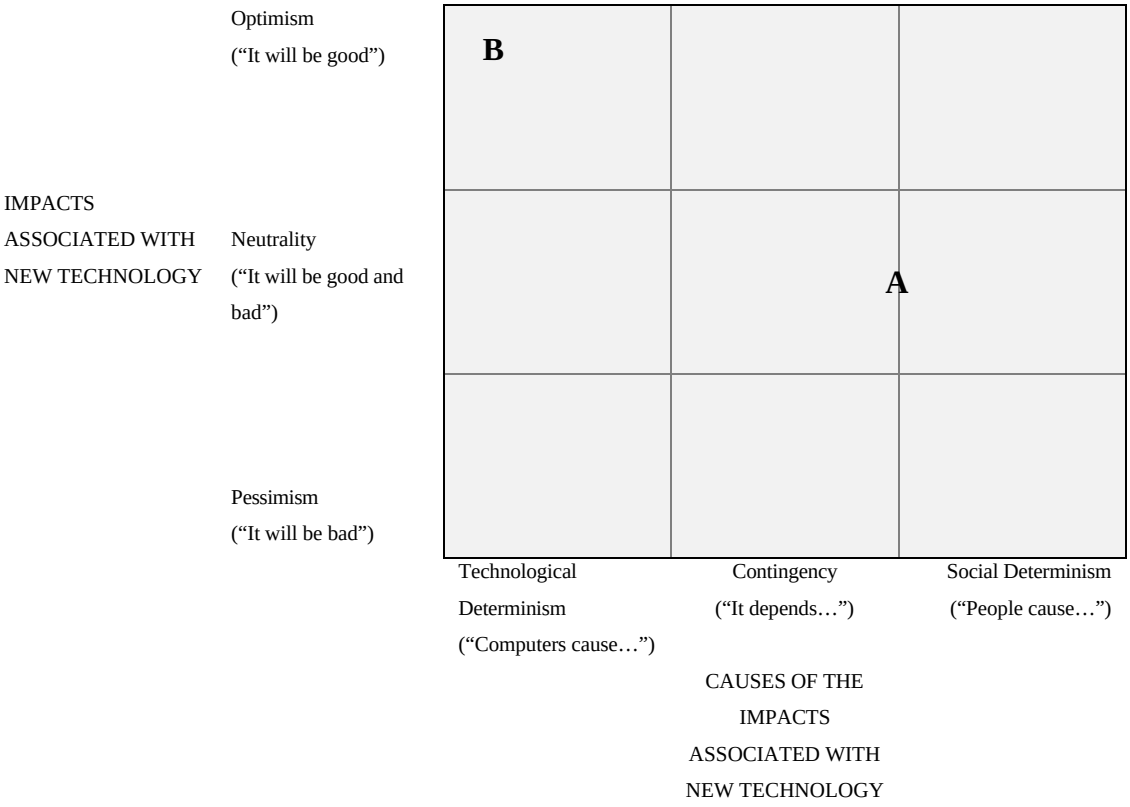
Second, a continuum of *impact causes*, from technological determinism to social determinism. Some people – technological determinists – believe that it is mainly inherent features of the technology which determine impacts of introducing ICTs; for example, that computers cause job losses. Others – social determinists – believe that it is mainly human choices within social structures which determine impacts of introducing ICTs; for example, that any job losses from computerisation arise when managers decide to exploit employees.

Each continuum has a midpoint of, respectively, neutrality about impacts and contingency about the causes of those impacts.

Such a framework necessarily simplifies a complex reality, but it can be used to understand differing positions on technology and development. For example, the analysis presented so far in this paper can be classified as roughly neutral to positive about the impact of ICTs, and contingent to socially determinist about the causes of those impacts. However, the position on impacts should be rather more balanced since two things have been downplayed.

First, failure has been downplayed. Yet estimates suggest that the majority of ICT-based initiatives end in *total failure* of a system that never works; *partial failure* in which major goals are unattained or in which there are significant undesirable outcomes; *sustainability failure* that succeeds initially but then fails after a year or so; or *replication failure* of a pilot scheme that cannot be reproduced (Heeks & Davies 1999).

Figure 4: Framework for Analysing Different Views About ICTs and Their Impacts



Second, negative impacts have been downplayed. Yet, as well as reducing costs and improving processing and communication of information, ICTs have also been associated in some cases with negative impacts. These have included job losses, increased stress, reduced flexibility, centralised control and surveillance, and impoverished communications (Heeks 1998). The overall analytical viewpoint of this paper therefore lies around position A in the framework diagram.

However, this is not the viewpoint adopted by many of those involved in setting the current development agenda. Two sample quotes were provided at the start of the paper, and there are plenty more:

> "Information and communication technologies (ICTs) are not only a significant factor in the performance and growth of economies – the importance of which is

> continuously growing – but they also represent a novel and effective tool to help advance sustainable human development" (UNDP 1998b)
>
> "Economic development can be fostered by tele-working and tele-services in some of the developing countries. These applications can help to increase the competitiveness of rural and remote areas and tele-services in future may provide opportunities for tele-shopping, on-line reservation services, entertainment, and commercial information." (Mansell & Wehn 1998:83)[3]

Here there is a pervading sense that the new technologies' impact will be positive, and that the technology itself is the cause of that impact. Much of the development discussion therefore lies firmly in position B in the diagram. It is driven on by hype from ICT vendors and the media that makes ICTs an icon for modern development, turning use of ICTs within development into an end in itself rather than a means of achieving other development goals. The main development objective becomes bringing as much technology to as many people as quickly as possible so that they can obtain the claimed benefits it provides. The main development problem becomes inequality of access to ICTs.

But is there anything really wrong with the position B view? After all, we could do with a bit of good news and optimism about development, couldn't we?

There seem to be a number of things wrong with position B which have not been grasped by many working within the development field. In the first place, there are *development opportunity costs* of the investments this position promotes. Panos (1998a) recounts more than 50 major initiatives aimed at increasing Internet connectivity in Africa alone. Add in other ICT expenditure and other low-income countries and we see significant investment by donors and by governments in this area.

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[3] This quote particularly seems to push things a little far. Can we really envisage a peasant household, dateline 2005, as follows: "I'm sorry I can't fetch water from the well today darling, I'm busy using my credit card to buy a new dishwasher from the Internet, and the hoeing and weeding will have to wait until I've completed this manuscript on Sartre for my publisher in Paris."

All of this comes with an opportunity cost since there are finite amounts of money, time and attention. Investing these in ICTs means explicitly not investing them in other development areas. Yet the 'ICT fetishists' have so far been unable to demonstrate how ICT-based information represents a more important resource than water, food, land, shelter, production technology, money, skills or power in the development process.

There are also more specific *information system and technology opportunity costs*. "Radio covers approximately 75 per cent of Africa's population and television 40 percent. The Internet's 0.1 per cent shows just how marginal a medium it still is." (Panos 1998a:2). Radio, TV and newspapers have all been used to disseminate agricultural, educational and business information to the poor. These technologies have capacity, interactivity and ownership limitations the new ICTs do not. However, in access and coverage terms they beat ICTs hands-down now and for the foreseeable future. The trouble is they are just not 'sexy' enough to capture decision-makers' attention. Even phones have slightly slipped down the visibility league tables because of this.

Likewise, a focus on ICTs and ICT-based information means that 'organic information systems' and 'indigenous knowledge' – the systems and knowledge which arise from within poor communities – are being systematically ignored and overridden. These provide, respectively, the best communication channel and best information source for the poor. Yet, again, they cannot match up to the sales pitch and glitz of the new technology, and even poor communities come to devalue their own resources and to over-value new technology.

Lastly, there are *factoral opportunity costs*. This approach to development means that attention switches to the technical factors underlying development and, since attention is finite, away from the political, the economic and the social factors underlying development. Experience suggests that, where this happens, 'development' allows those with political, economic and social power to reinforce their position at the expense of those without such power.

E. Development Priorities for Information, ICTs and Poverty

Given the opportunity costs and other issues identified above, where should the main priorities lie for the development agenda? What are the implications of the analytical position presented here? One may conclude that:

- *The poor need knowledge to access, assess and apply existing information and need resources for action more than they need access to new information.* Information deficits are certainly an issue for poor entrepreneurs, but a more important part of the total picture – and a prerequisite for making use of information – are resources like skills, knowledge and money.

- *The poor need access to new locally-contextualised information more than access to existing information from an alien context. The information needs of the poor will be met more by informal, 'organic' information systems than by formal, ICT-based information systems.* The poor lack, and need, information of relevance to their local context. This may come more from interaction between communities and community members rather than from the typical ICT-based pattern of data transfer from North to South. Based on both overt and social resourcing, such new information will best be delivered to the poor by organic information systems that arise from within their community. Failing that, because of access issues, information may be better delivered by literate or intermediate technologies – such as telephones – than by new ICTs. Where ICTs are used, they should provide a supplement, not substitute, to existing information systems.

- *The poor need ICTs more to give them 'voice' than to give them 'hands', 'brains' or 'ears'.* ICTs *can* play a limited enabling role in the alleviation of poverty, but will be of greatest value as a technology to provide information from and about the poor. The new technology will also, given resourcing and data points made above, be of value in helping community members interact, though only where it beats

face-to-face or phone interaction. This may principally occur via email with members based in distant potential markets either at home or overseas.

- *The poor need 'intelligent intermediaries' to use ICTs*. These intermediaries are needed to bridge both the overt and the social resource endowment gaps between what the poor have and what they would need in order to use ICTs. Indeed, ICTs currently have a far greater enabling value in building capacity within intermediary institutions – in 'helping the helpers' – than in directly affecting the poor. For example, ICTs have enabled NGOs to share experiences about – and thereby improve – their microcredit programmes and have assisted "those campaigning for greater democracy, social equality and protection of the environment" (Panos 1998a:2; World Bank 1998). There are also individual examples of ICTs assisting government agencies, universities, and hospitals, some of which – albeit often indirectly and imperfectly – can serve the poor (Talero & Gaudette 1995).

- *The poor need 'community intermediaries' to use ICTs*. The identity of ICT-using intermediaries is critical. Following discussion of proximity, trust and knowledge (including the ability to combine 'techknowledge' about ICT with 'context knowledge' about the environment in which it is used), we can see that the best intermediaries will be drawn from within poor communities, as in Alexandra. Poor communities with the highest 'social capital' of effective community institutions will therefore be the most effective users of ICTs. Initiatives in which technical and contextual knowledge are disconnected, with intermediaries and control located outside the community, are more likely to fail, as in North-West Province.

- *The poor will only reap the fullest benefits of ICTs when they own and control both the technology and its related know-how*. Intermediaries are a currently-necessary mechanism. Yet their presence reduces the ability of the poor to directly control definition of information problems, design of new information systems, and ownership and operation of those systems. This is essential to truly effective management and steering of the new technology. However, the current resource

and contextual barriers to this are massive: an order of magnitude greater than those for connecting up intermediaries.

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